FINAL REPORT
SEPTEMBER 2007

REPORT NO. 06-14

OBSERVATION OF TESTING OF THE MARINE CORPS EXPEDITIONARY FIRE SUPPORT SYSTEM (EFSS)

Prepared for:

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2200 Lester Street
Quantico, VA 22134-6050

DEFENSE AMMUNITION CENTER
VALIDATION ENGINEERING DIVISION
MCALESTER, OKLAHOMA 74501-9053

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OBSERVATION OF TESTING OF THE MARINE CORPS EXPEDITIONARY FIRE SUPPORT SYSTEM (EFSS)

ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked to monitor testing of the Expeditionary Fire Support System (EFSS). The testing was conducted at the National Automotive Test Center (NATC) in Silver Spring, Nevada.

The objective was to monitor testing at the NATC of the Marine Corps EFSS that consisted of:

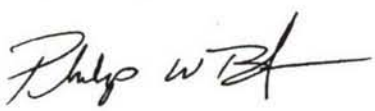
1. Internally Transportable Vehicle, Prime Mover (Serial Number 00005) towing the Ammunition Trailer.

Chains and binders were used to secure 30 inertly loaded 120MM cylindrical metal containers on the ammunition trailer. Metal bars were used along the outermost rounds to prevent damaging the cans when the chains were tightened. Based upon the testing that was conducted at NATC, the securement system on the ammunition trailer when towed by the Internally Transportable Vehicle, Prime Mover is adequate.

2. Internally Transportable Vehicle, Prime Mover (Serial Number 00006) towing the 120MM mortar.

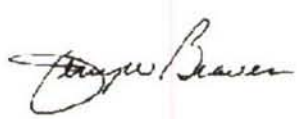
The second Internally Transportable Vehicle, Prime Mover had four (4) inertly loaded 120MM cylindrical metal containers secured to the vehicle using web straps. The vehicle also towed a 120MM mortar. Based upon the testing conducted at NATC, the Internally Transportable Vehicle, Prime Mover can adequately transport four (4)120MM cylindrical metal containers when secured directly to the vehicle using web straps.

Prepared by:



PHILIP W. BARICKMAN
Lead Validation Engineer

Reviewed by:



JERRY W. BEAVER
Chief, Validation Engineering Division

U.S. ARMY DEFENSE AMMUNITION CENTER

VALIDATION ENGINEERING DIVISION
MCALESTER, OK 74501-9053

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PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked to monitor testing of the Expeditionary Fire Support System (EFSS). The testing was conducted at the National Automotive Test Center (NATC) in Silver Spring, Nevada.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command (JMC), Rock Island, IL. Reference is made to the following:

1. AR 740-1, 15 June 2001, Storage and Supply Activity Operation.

2. OSC-R, 10-23, Mission and Major Functions of U.S. Army Defense Ammunition Center (DAC) 21 Nov 2000.

C. OBJECTIVE. The objective was to monitor testing at the NATC of the Marine Corps EFSS that consisted of:

1. Internally Transportable Vehicle, Prime Mover (Serial Number 00005) towing the Ammunition Trailer.
2. Internally Transportable Vehicle, Prime Mover (Serial Number 00006) towing the 120MM Mortar.

D. CONCLUSIONS.

1. Chains and binders were used to secure 30 inertly loaded 120MM cylindrical metal containers on the ammunition trailer. Metal bars were used along the outermost rounds to prevent damaging the cans when the chains were tightened. Based upon the testing that was conducted at NATC, the securement

system on the ammunition trailer when towed by the Internally Transportable Vehicle, Prime Mover is adequate.

2. The second Internally Transportable Vehicle, Prime Mover (Serial Number 00006) had four (4) inertly loaded 120MM cylindrical metal containers secured to the vehicle using web straps. The vehicle also towed a 120MM mortar. Based upon the testing conducted at NATC, the Internally Transportable Vehicle, Prime Mover can adequately transport four (4)120MM cylindrical metal containers when secured directly to the vehicle using web straps.

PART 2 – DAC ATTENDEES

ATTENDEE	MAILING ADDRESS
Philip Barickman DSN 956-8992 (918) 420-8992	Director U.S. Army Defense Ammunition Center ATTN: SJMAC-DEV 1 C Tree Road, Bldg. 35 McAlester, OK 74501-9053
Patrick Dougherty DSN 956-8225 (918) 420-8225	Director U.S. Army Defense Ammunition Center ATTN: SJMAC-DET 1 C Tree Road, Bldg. 35 McAlester, OK 74501-9053

PART 3 - TEST EQUIPMENT

1. Truck, Utility: Internally Transportable Vehicle, Prime Mover (PM-T), M1163, 4X4
   Manufactured by GD-OTS
   Customer Registration Number: 626364
   Serial Number: 00005
   Delivery Date: November 2006
   Curb Weight: 3,875 pounds
   Payload Maximum: 2,000 pounds
   Towed the Ammunition Trailer

2. Truck, Utility: Internally Transportable Vehicle, Prime Mover (PM-W), M1162, 4X4
   Manufactured by GD-OTS
   Customer Registration Number: 626365
   Serial Number: 00006
   Delivery Date: November 2006
   Curb Weight: 3,875 pounds
   Payload Maximum: 2,000 pounds
   Towed the 120MM Mortar

PART 4 – TEST PROCEDURES

Course	Speed	Description
North Butte Hilly	5-10 MPH	Embedded rock grade with a maximum grade of 32 percent.
North Butte Battlefield Loop	5-10 MPH	Route consisting of large boulders up to approximately one foot in height to simulate shell craters and severely rough terrain.
Embedded Rock Trail	10 MPH	Gravel loop containing exposed rock between 0.5 and 4 inches in height.
Alternating Bump Course	5 MPH	Alternating positive bumps having a height of 4 inches and a peak-to-peak distance of 15 feet.
2-Inch Washboard Course	15 MPH	Uniform washboard course containing an amplitude of 2-inch and 24-inch peak-to-peak spacing.
Chelsea Proving Grounds Bumps	10-15 MPH	Course consisting of 4-inch deep potholes, 2.25-inch deep potholes, 3 inch angle troughs, and 2.5- inch troughs.

PART 5 - TEST RESULTS

5.1

Date of Testing: 31 July 2007

Location: National Automotive Test Center (NATC)

Test Item: Truck, Utility: Internally Transportable Vehicle, Prime Mover

Serial Number: 00005

Towed Item: Ammunition Trailer loaded with 30 inertly loaded 120MM cylindrical metal containers with the payload secured by chains, binders and metal bars.

Gross Weight: 6,945 pounds (includes vehicle and ammunition trailer)

Photo 1. Prime Mover with Ammunition Trailer

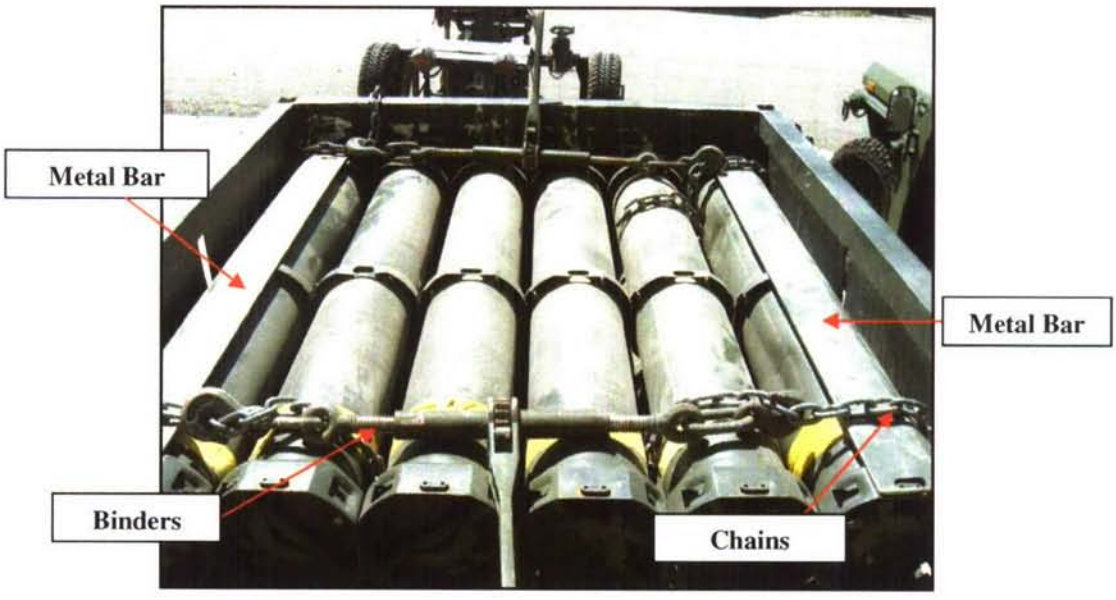

Photo 2. Ammunition Securement Provisions

Course	Miles	Results
North Butte Hilly (Ascended)	0.8	No movement or damage to the payload or tiedowns.
North Butte Battlefield Loop	3.6	No movement or damage to the payload or tiedowns.
North Butte Hilly (Descended)	0.8	No movement or damage to the payload or tiedowns.
Embedded Rock Trail	4.5	No movement or damage to the payload or tiedowns.
Alternating Bump Course	0.4	No movement or damage to the payload or tiedowns.
2-Inch Washboard Course	0.1	No movement or damage to the payload or tiedowns.
Chelsea Proving Grounds Bumps Course	0.5	No movement or damage to the payload or tiedowns.

CONCLUSION: Throughout the testing the payload and securement system stayed securely in place. Based upon the testing at NATC, the securement system on the ammunition trailer when towed by the Internally Transportable Vehicle, Prime Mover is adequate.

5.2

Date of Testing: 31 July 2007

Location: National Automotive Test Center (NATC)

Test Item: Truck, Utility: Internally Transportable Vehicle, Prime Mover with four (4) inertly loaded 120MM cylindrical containers secured using web straps.

Serial Number: 00006

Towed Item: 120MM mortar.

Gross Weight: 6,205 pounds (includes vehicle and towed mortar)

Photo 3. Prime Mover with 120MM Mortar

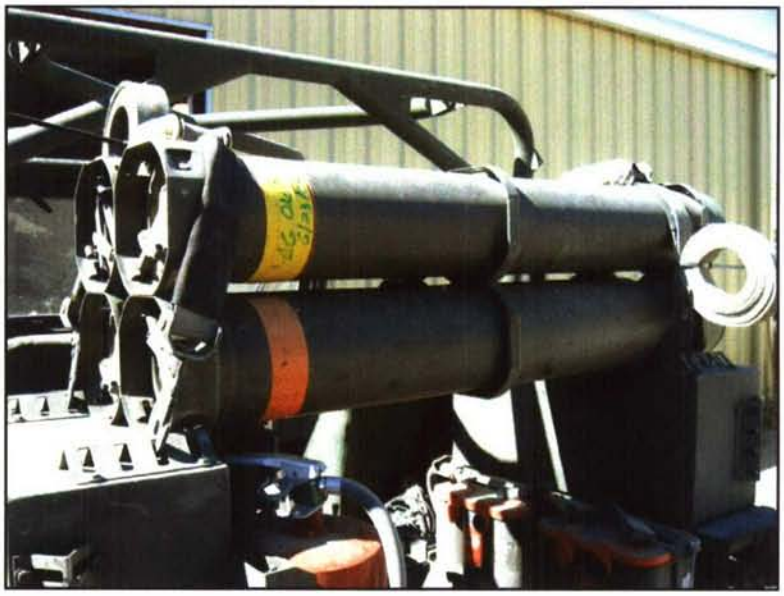

Photo 4. Ammunition Securement Provisions

Course	Miles	Results
North Butte Hilly (Ascended)	0.8	No movement or damage to the payload or tiedowns.
North Butte Battlefield Loop	3.6	No movement or damage to the payload or tiedowns.
North Butte Hilly (Descended)	0.8	No movement or damage to the payload or tiedowns.
Embedded Rock Trail	4.5	No movement or damage to the payload or tiedowns.
Alternating Bump Course	0.4	No movement or damage to the payload or tiedowns.
2-Inch Washboard Course	0.1	No movement or damage to the payload or tiedowns.
Chelsea Proving Grounds Bumps Course	0.5	No movement or damage to the payload or tiedowns.

CONCLUSION: Throughout testing, the payload on the vehicle stayed securely in place. Based upon the testing at NATC, the Internally Transportable Vehicle, Prime Mover can adequately transport four (4) 120MM cylindrical metal containers when secured directly to the vehicle.